

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

APPEAL NO. _____

First named inventor: John A. Baumann

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Art Unit: 3727

Title: RECONFIGURABLE CLAMPING SYSTEMS

Confirm. No. 1498

APPEAL BRIEF

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1. REAL PARTY IN INTEREST

The real party in interest is the assignee, The Boeing Company.

2. RELATED APPEALS AND INTERFERENCES

No appeals or interferences are known to have a bearing on the Board's decision in the pending appeal.

3. STATUS OF CLAIMS

Claims 1, 5, 7-10, 13-17, 19 and 21-61 are cancelled.

Claims 2-4, 6, 11-12, 18, 20 and 62-68 are pending.

Claims 4, 6, 11-12, 18, 20 and 68 are withdrawn from consideration.

Claims 2-3 and 62-67 are rejected.

The rejections of claims 2 and 62-66 are being appealed.

4. STATUS OF AMENDMENTS

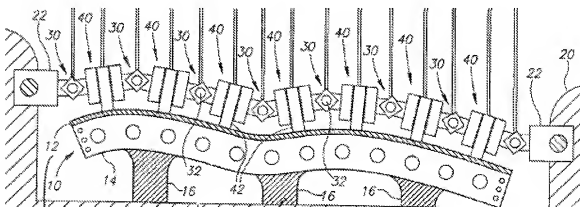
No amendment was filed subsequent to the final rejection dated 9 June 2011.

5. SUMMARY OF CLAIMED SUBJECT MATTER

Friction stir welding (FSW) is a solid-state process for joining metal parts. A rotating welding tool is plunged into the parts and moved along a weld line. The rotating tool generates frictional heat and plastic deformation along the weld line.

As the tool is moved along the weld line, it can create forces that push the parts away from each other. To prevent the parts from being pushed apart, the parts may be clamped together.

The applicant was faced with the problem of applying clamping forces to parts having complex surfaces. The application addresses this problem. The claims recite systems that can clamp together parts having complex surfaces. One example of such a system is illustrated in Figure 1 of the application. The system of Figure 1 applies clamping forces to a top work piece 12 having a complex surface.



Base claim 62

Base claim 62 recites a system for clamping a top work piece to an underlying work piece. An example of a system 25 for clamping a top work piece 12 to an underlying work piece 14 is illustrated in Figure 1 (page 3, lines 9-11). The system 25 includes a crib 16 for supporting the underlying work piece 14 (page 3, lines 11-12), and a chain 26 of interspersed coupling units 30 and force

applying units 40 (page 3, lines 15-16). The chain 26 extends across the crib 16 (page 3, lines 20-21).

As shown in Figure 1, the coupling units 30 allow the force-applying units 40 to conform to the upper surface of the top work piece 12 (page 4, lines 15-18). The force-applying units 40 can press the top work piece 12 against the underlying work piece 14 (page 4, lines 18-21).

Base claim 64

Base claim 64 recites a system for clamping aircraft skin having a complex surface shape to an aircraft frame. An example of a system 25 for clamping aircraft skin 12 having a complex surface shape to an aircraft frame 14 is illustrated in Figure 1 (page 3, lines 9-11). The system 25 includes a crib 16 configured to support the aircraft frame 14 (page 3, lines 11-12), and a chain 26 of interspersed coupling units 30 and force applying units 40 (page 3, lines 15-16). As shown in Figure 1, the chain stretches across the surface of the skin 12 (page 3, lines 20-21), the coupling units 30 allow the force-applying units 40 to conform to the complex shape of the skin 12 (page 4, lines 15-18), and the force-applying units 40 can press the skin 12 against the frame 14 (page 4, lines 18-21).

Dependent claim 65

Claim 65 recites the system of claim 64, and it also recites the frame 14 and the skin 12 as claim elements. Figure 1 and page 3, lines 9-11 illustrate an example of skin 12 and a frame 14.

Base claim 66

Base claim 66 recites a system for clamping a top work piece to an underlying work piece. An example of a system 25 for clamping a top work piece 12 to an underlying work piece 14 is illustrated in Figure 1 (page 3, lines 9-11). The system 25 includes a crib 16 for supporting the underlying work piece 14

(page 3, lines 11-12), and a chain 26 of lockable coupling units 30 and force applying units 40 (page 3, lines 15-16). As shown in Figure 1, the coupling units 30 are interspersed with the force applying units 40, and the chain 26 extends across the crib 16.

The lockable coupling units 30 are unlocked to make the chain 26 flexible and allow the force-applying units to conform to the upper surface of the top work piece 12 (page 4, lines 15-18). The coupling units 30 are locked to make the chain 26 rigid and allow the force-applying units 40 to press the top work piece 12 against the underlying work piece 14 (page 4, lines 18-21).

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

a. Rejection of claims 62 to 66 and 2 under 35 USC §102(b) as being anticipated by Sollmann GB 2,169,836.

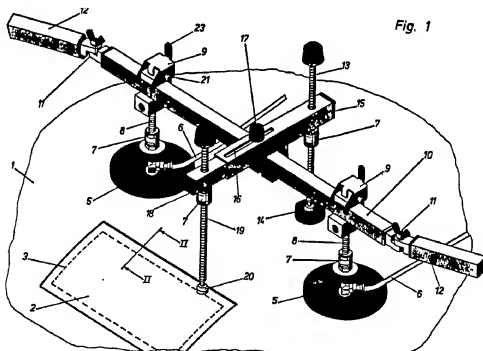
b. Rejection of claims 64 and 65 under 35 USC §103(a) as being unpatentable over Sollmann GB 2,169,836.

c. Rejection of claims 2, 62, 63 and 66 under 35 USC §102(b) as being anticipated by Dearman U.S. Patent No. 4,356,615.

7. ARGUMENTS

REJECTION OF CLAIMS 2 AND 62 TO 66 UNDER 35 USC §102(B) AS BEING ANTICIPATED BY SOLLMANN GB 2,169,836

Sollmann describes a retaining tool for obtaining a strong and tight glue joint between a body plate 1 and a repair piece 2 (Abstract). The retaining tool includes a tubular bar 10 and suction cups 5 at opposite ends of the tubular bar 10. The suction cups 5 secure the bar 10 to the body plate 1. The retaining tool further includes an intermediate bar 15 that is perpendicular to the tubular bar 10. The intermediate bar 15 supports adjusting screws 13 and 19 at opposite ends. The screw 19 is adjusted to press the repair part 2 against the body plate 1. Sollmann is silent about a specific application for the retaining tool.



Claim 64

The '102 rejection should be withdrawn because it is based on factual deficiencies. Sollmann doesn't describe a single feature of claim 64.

Sollmann does not describe a crib configured to support an aircraft frame. Page 3 of the final office action admits that Sollmann does not show a crib in any of the figures. Sollmann's specification does not describe one either.

Sollmann does not describe a chain of interspersed coupling units and force applying units. Sollmann's so-called force-applying unit is a screw 19, which forces the repair piece 2 against the body plate 1.

The bar 15, which supports the screw 19, is not conformable to a complex shape of aircraft skin. The bar 15 is straight and rigid.

Page 3 of the final office action offers a different reading of Sollmann. It characterizes Sollmann's bars 10 and 12, links 11 and screws 7 as a chain of interspersed coupling units and force-applying units. However, those bars 10 and 12 are not interspersed with the screws 7. The screws 7 are supported at opposite ends of the single rigid bar 10. The links 11 do not allow the screws 7 to conform to the shape of an underlying work piece.

Moreover, the screws 7 do not apply pressure to the repair piece 2. Rather, the single screw 19 at the end of the intermediate bar 15 applies the pressure.

Even if the suction cups 5 are characterized as top work pieces, the screws 7 do not press the suction cups 5 against the body plate 1. To the contrary, suction via lines 6 is used to drawn the suction cups 5 against the body plate 1, and the screws 7 tend to pull the suction cups 5 away from the body plate 1 as the screw 19 applies downward pressure on the repair piece 2.

In yet a different (inconsistent) reading of Sollmann, the final office action characterizes Sollmann's repair piece 2 as a top work piece 2 and element 4 as an underlying work piece 4. According to page 2, line 10 of Sollmann, however, element 4 is not a work piece. It is a layer of glue.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Because Sollmann does not describe each and every element of base claim 64, the '102 rejection of base claim 64 should be withdrawn.

Claim 65

The '102 rejection of claim 65 should be withdrawn because it is based on additional factual deficiencies and it is also legally deficient.

The final office action admits that Sollmann does not expressly describe aircraft skin or an aircraft frame. Page 3 simply alleges that Sollmann's system is "capable of being applied to an aircraft skin/frame." Due to this factual deficiency, the '102 rejection of claim 65 should be withdrawn.

Perhaps the final office action is arguing that Sollmann inherently describes the use of a retaining tool on aircraft skin and frame. However, the final office action does not make a showing to support inherency.

"To serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it

would be so recognized by persons of ordinary skill." Continental Can Co. USA v. Monsanto Co., 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991)

The final office action provides no such evidence. Due to this legal deficiency, the '102 rejection of claim 65 should be withdrawn.

Claims 62, 63, and 2

The '102 rejection should be withdrawn because it is based on factual deficiencies. Sollmann doesn't describe a single feature of base claim 62.

Sollmann does not describe a crib configured to support an underlying work piece. Page 3 of the final office action admits that Sollmann does not show a crib in any of the figures. Sollmann's specification does not describe one either.

Sollmann does not describe a chain of interspersed coupling units and force applying units, the chain extending across the crib, the coupling units allowing the force-applying units to conform to an upper surface of a top work piece. Sollmann's so-called force-applying unit is a single screw 19, which forces the repair piece 2 against the body plate 1. That single screw 19 is supported at the end of a bar 15.

That bar 15 is not conformable to the repair piece 2. That bar 15 is straight and rigid.

Claim 66

The '102 rejection should be withdrawn because it is based on factual deficiencies. Sollmann doesn't describe a single feature of base claim 66.

Sollmann does not describe a crib for supporting an underlying work piece. That much is acknowledged by page 3 of the final office action.

Sollmann doesn't describe a chain of lockable coupling units and force applying units, the coupling units interspersed with the force applying units, the chain extending across the crib. Sollmann shows only a single force-applying unit (screw 19) for pressing the repair piece 2 against the body plate 1. That force-applying unit 19 is supported at the end of a rigid bar 15.

Sollmann does not describe lockable coupling units that are (1) unlocked to make the chain flexible and allow the force-applying units to conform to the upper surface of the repair piece 2 and that are (2) locked to make the chain rigid and allow the force-applying units to press the repair panel 2 against the body plate 1. Sollmann's rigid bar 15 is not lockable and unlockable. The bars 10 and 12 might be lockable and unlockable (via linkage 11), but those bars 10 and 12 are not interspersed with the force applying unit (screw 19).

II
**REJECTION OF CLAIMS 64 AND 65 UNDER 35 USC §103(A) AS BEING
UNPATENTABLE OVER SOLLMANN GB 2,169,836**

The '103 rejection should be withdrawn because it is based on factual and legal deficiencies.

As discussed in argument I, Sollmann does not describe a single feature of claim s 64 or 65. Therefore, the '103 rejection is factually deficient.

The final office action provides no rational underpinnings or articulated reasoning for using a crib in combination with Sollmann's retaining tool.

The final office action provides no rational underpinnings or articulated reasoning for modifying Sollmann's bar 15 to make it flexible so it can conform to the complex shape of a work piece.

The final office action provides no rational underpinnings or articulated reasoning for creating a chain of screws 19 and flexible bars.

The final office action provides no rational underpinnings or articulated reasoning for applying Sollmann's retaining tool to aircraft skin and frame. It provides no evidence of the desirability to form a glue joint between aircraft skin and an aircraft frame. The final office action only asserts claims 64 and 65 are obvious because it "would only require routine experimentation with predictable results" and it would amount to "applying a know technique to a known device ready for improvement to yield predictable results."

These assertions amount to little more than conclusory statements of obviousness. The final office action doesn't articulate the type of experimentation that would be required or why that experimentation would be routine or why the

results would be predictable. Moreover, routine experimentation is not an obviousness rationale listed under MPEP 2143. Rather, it is a test for enablement.

MPEP 2143 does list "applying a known technique" as a rationale for obviousness. However, in order to rely on this rationale, MPEP 2143 requires the following findings:

- (1) a finding that the prior art contained a "base" device (method, or product) upon which the claimed invention can be seen as an "improvement"; and
- (2) a finding that the prior art contained a known technique that is applicable to the base device (method, or product); and
- (3) a finding that one of ordinary skill in the art would have recognized that applying the known technique would have yielded predictable results and resulted in an improved system.

The final office action does not make a single one of these findings.

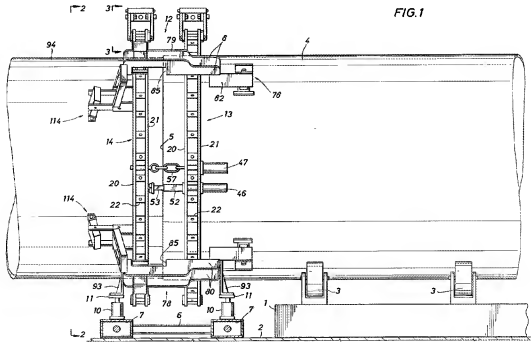
Thus, the 103 rejection does not comply with KSR International Co. v. Teleflex Inc., 82 USPQ2d 1385, 1395-97 (2007), which holds "rejections on obviousness cannot be sustained with mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." Therefore, the '103 rejection of claims 64 and 65 should be withdrawn.

III

REJECTION OF CLAIMS 2, 62, 63 AND 66 UNDER 35 USC §102(B) AS BEING ANTICIPATED BY DEARMAN U.S. PATENT NO. 4,356,615

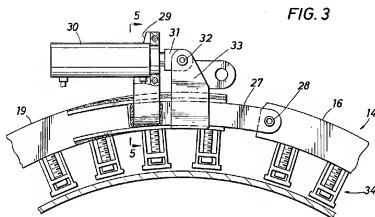
The '102 rejection should be withdrawn because it is based on factual deficiencies.

Dearman describes an apparatus for aligning the confronting ends of two pipes 4 and 94 in an end-to-end relation (col. 1, lines 6-10). The apparatus includes a fixed support base 1 and a pair of spaced apart rollers 3 that form a cradle for a large pipe 4 (col. 3, lines 26-32). The apparatus further includes a pair of clamp units 13 and 14 that are spaced apart (col. 3, lines 47-50). The spacing between the clamp units 13 and 14 is adjustable (col. 4, lines 25-31).



Each clamp unit 13 and 14 includes a plurality of arcuate segments 16-19 (col. 3, lines 51-52). The segments 16-19 are pivoted together. Each clamp unit

13 and 14 is provided with a plurality of adjustable pressure devices 34 (col. 4, lines 5-6). Each pressure device 34 includes a screw 35 extending through an opening in a spacer 22 (col. 4, lines 6-8).



When the clamp unit 13 is closed, the pressure members 34 bear forcibly against the end 5 of the pipe 4 (col. 5, lines 66-68). Another pipe 94 is then moved in an end-to-end relation with the clamped pipe 4 (col. 6, lines 9-12). That pipe 94 is clamped by the clamp unit 14, and the spacing between the clamp units 13 and 14 is adjusted to move the pipe ends closer together (col. 7, lines 21-24).

Claims 2, 62 and 63

Dearman does not describe a chain of force-coupling and force applying units. Dearman describes a chain 13 of pivoted arcuate segments 16-19. Screws 35 extend through the arcuate segments 16-19.

The clamp unit 13 does not extend across the cradle 1.

The screws 35 of the pressure devices 34 do not press a top work piece onto an underlying work piece. They simply bear down on the end 5 of a pipe 4.

Page 4 of the final office action alleges that pipe 4 is a top work piece and pipe 94 is an underlying work piece. However, Dearman clearly shows pipes 4 and 94 on the ground in an end-to-end relationship.

Page 4 also alleges that elements 6 and 10 form a cradle for supporting the pipe 4. However, Dearman doesn't support the allegation. Dearman clearly states that support base 1 and a pair of spaced apart rollers 3 form a cradle for the pipe 4 (col. 3, lines 26-32).

Thus, Dearman does not describe each and every feature recited in base claim 62. Therefore, the '102 rejection of base claim 62 and its dependent claims 2 and 63 should be withdrawn.

Claim 66

Dearman does not describe a chain of force-coupling and force applying units. Dearman describes a chain 13 of pivoted arcuate segments 16-19. Screws 35 extend through the arcuate segments 16-19.

The clamp unit 13 does not extend across the cradle 1.

The screws 35 of the pressure devices 34 do not press a top work piece onto an underlying work piece. They simply bear down on the end 5 of a pipe 4.

Dearman doesn't describe multiple lockable coupling units that are unlocked to make the clamping unit 13 flexible and locked to make the unit 13 rigid. Dearman's arcuate segments 16-19 are freely pivoted together. The ends of segments 16 and 19 are coupled together by a tongue 27 (col. 3, lines 61-62). A ram 30 is operated to expand and retract the clamping unit 13 (col. 3, lines 64+).

Dearman's arcuate segments 16-19 (coupling units) are not adjustable to "conform" to the surface of a work piece. The arcuate segments 16-19 are configured to fit around a pipe 4 and nothing other than the pipe 4.

If any adjustments are made, those adjustments are made to the screws 35 (force applying units).

Thus, Dearman does not describe each and every feature recited in base claim 66. Therefore, the '102 rejection of base claim 66 should be withdrawn.

For the reasons above, the rejections should be reversed. The Honorable Board of Patent Appeals and Interferences is respectfully requested to reverse these rejections.

Respectfully submitted,

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Date: January 17, 2012

8. CLAIMS APPENDIX

1. (Cancelled)
2. (Previously presented) The system of Claim 63, wherein the lockable pivot and the first and second arms function as a bendable elbow.
3. (Previously presented) The system of Claim 2, wherein the bendable elbow includes interlocking teeth, arranged to interlock when the lockable pivot is locked.
4. (Withdrawn) The system of Claim 63, wherein the pivot ball is knurled, and wherein pincers secure the arms to the ball.
5. (Cancelled)
6. (Withdrawn) The system of Claim 63, wherein the lockable pivot includes a twist to lock mechanism.
- 7-10 (Cancelled)
11. (Withdrawn) The system of Claim 63, wherein the lockable pivot includes a solenoid.
12. (Withdrawn) The system of Claim 63, wherein the force applying unit includes a threaded plunger.
- 13-17 (Cancelled)

18. (Withdrawn) The system of Claim 62, further comprising at least one length adjusting unit attached to and interspersed with the one or more force applying units and the one or more coupling units, the length adjusting unit arranged to adjustably change length to adjust a length of the chain.

19. (Cancelled)

20. (Withdrawn) The system of Claim 18, wherein the length adjusting unit includes a turnbuckle.

21-61 (Cancelled)

62. (Previously presented) A system for clamping a top work piece to an underlying work piece, the system comprising:

a crib for supporting the underlying work piece; and

a chain of interspersed coupling units and force applying units, the chain extending across the crib, the coupling units allowing the force-applying units to conform to the upper surface of the top work piece, the force-applying units for pressing the top work piece against the underlying work piece.

63. (Previously presented) The system of claim 62, wherein at least one of the coupling units includes a single pivot, and a first arm and a second arm linked by the single pivot.

64. (Previously presented) A system for clamping aircraft skin having a complex surface shape to an aircraft frame, the system comprising:
- a crib configured to support the aircraft frame; and
 - a chain of interspersed coupling units and force applying units, the chain stretching across the surface of the skin, the coupling units allowing the force-applying units to conform to the complex shape of the skin, the force-applying units for pressing the skin against the frame.
65. (Previously presented) The system of claim 64, further comprising an aircraft frame supported by the crib; and aircraft skin having a complex surface shape, the aircraft skin pressed against the aircraft frame.
66. (Previously presented) A system for clamping a top work piece to an underlying work piece, the system comprising:
- a crib for supporting the underlying work piece; and
 - a chain of lockable coupling units and force applying units, the coupling units interspersed with the force applying units, the chain extending across the crib, the lockable coupling units being unlocked to make the chain flexible and allow the force-applying units to conform to the upper surface of the top work piece, the coupling units being locked to make the chain rigid and allow the force-applying units to press the top work piece against the underlying work piece.

67. (Previously presented) The system of claim 2, wherein the first and second arms include interlocking teeth.

68. (Withdrawn) The system of claim 2, wherein the pivot includes a ball and wherein one end of each arm lockably grips the ball.

9. EVIDENCE APPENDIX

None

10. RELATED PROCEEDINGS APPENDIX

None